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# Lowering of blood glucose and its variability by computerized decision support

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## Objective:

The safety and effectiveness of a medical decision support system controlling stress hyperglycemia (Glucosafe), was tested prospectively in a medico-surgical intensive care unit (ICU) with a heterogeneous patient population. Using penalty functions for insulin and blood glucose, Glucosafe balances insulin treatment against glycemic outcome.

## Method:

Insulin treatment was provided according to the local usual insulin algorithm (days 1 and 3) or according to Glucosafe (day 2) to reach the target range of 90-150 mg/dl. Nutrition was provided according to departmental guidelines. After the first 6 patients penalty functions were adapted by increasing target blood glucose from  $99 \pm 10\%$  to  $104 \pm 10\%$  mg/dl and increasing the penalty for high insulin doses.

## Results :

Glucosafe was tested on 13 patients (age:  $69.8 \pm 11.1$ ; SAPS II:  $44 \pm 16$ ). The use of Glucosafe reduced both the inpatient mean and SD of blood glucose significantly on day 2 (mean:  $104 \pm 7$  mg/dl;  $N=98$ ) relative to both day 1 (mean:  $140 \pm 11$  mg/dl;  $N = 90$ ,  $p < 0.0005$ ) and day 3 (mean:  $116 \pm 10$  mg/dl;  $N = 60$ ,  $p < 0.005$ ). Hypoglycemia ( $< 60$  mg/dl) was not observed on any day.

On day 2 (Glucosafe) 78% of measurements were in the target range compared to 67% on day 1 and 74% on day 3.

On average insulin doses for days 1 and 3 combined were 2,08 units/h. Glucosafe used higher average insulin doses (3.62 and 2.4 units/h) before and after the adaptation of the penalty function. There was no significant difference in glycemia before and after the adaptation.

## Conclusion:

Using Glucosafe with penalty functions adapted to the local environment safely improved the performance of glycemic control.